In 1885, when Walter G. Davis became director, the central office was moved from the astronomical observatory to a new building in Córdoba, and the number of instruments was increased so that all the usual meteorological studies could be made. During the following years the program of the founder was continued, the network of stations contnually increased, installations improved, and stations frequently inspected.

The observations were reduced, discussed, and published as funds permitted. At the end of 1901 the observations from 47 stations, many of which included regions distant from the centers of population, had been published. At this time the Central Office was moved to Buenos Aires as the extension of telegraph lines to outlying regions had made it possible to obtain telegraphic reports of simultaneous observations from the Bolivian frontier to Santa Cruz and from the Andes to the Atlantic. At the end of 1901 the service included 11 first-class stations with automatic registers; 68 second-class stations at which observations of pressure, temperature, wind direction and force, cloudiness, and precipitation were made at 7 a. m., 2 p. m., and 9 p. m.; 9 third-class stations which differed from the second class only in not having barometers; and 240 rainfall stations. With few exceptions these stations were accessible by telegraph.

The first daily meteorological bulletin appeared on January 1, 1902, and *the first daily weather map* on February 21 of the same year. Up to September, 1902, the data were based on the 2 p. m. observation; but owing to delays in telegraphing, it was not possible to publish the map before midnight, and it did not reach the public until the following morning. Beginning with September, 1902, the 7 a. m. observations were used for the map until December 31, 1903. On January 1, 1904, the observation hours were changed to 8 a. m., 2 p. m., and 8 p. m.; the morning observation was used for the weather map. From July, 1904, the 8 p. m observation of the preceding day was included in the morning telegram. The map was published in the printing establishment of the Meteorological Office, which also handled all the publications of the Ministry of Agriculture.

In September, 1904, *the forecasting service* began; forecasts were made for the 36-hour period ending at 8 p. m. of the following day. Forecast display flags were used at the principal Atlantic ports and the forecasts were delivered to the National Telegraph lines for transmission to the telegraph offices throughout the country. When the forecast work was inaugurated the service had, at places accessible by telegraph, 140 stations where all elements were observed and 420 rainfall stations in Argentina, as well as the observations by exchange of 5 Brazilian, 1 Uruguayan, and 1 Chilean station. In November, 1904, these data were increased by a nightly synopsis which gave the weather conditions since the morning observation. This synopsis was sent by a number of stations sufficient to give a general idea of the weather prevailing during the day; it was given to the morning papers for publication.

In the beginning of 1904 the Meteorological Office took charge of *the meteorological and magnetic station established on Laurie Island* in the South Orkneys by the Scottish Antarctic Expedition during the preceding summer (1902–3). This station has been continued, the observers being relieved each summer (December or January). Hourly direct meteorological readings of all the instruments are made, and automatic registers have been running since the station was established. Two complete sets of absolute magnetic observations have been made each week and the photographic variometers are constantly in use. The only interruptions are those due to the need of repairs which could not be made with the equipment at hand.

With the station on Laurie Island, $\phi = 60° 43'$ S, the Argentine Meteorological Service has an extension in latitude of nearly 40 degrees, in which there are 42 first-class stations, 152 second-class stations, 12 third-class stations, and 1,930 rainfall stations. The 8 a. m. and 8 p. m. observations from 190 of these stations of the first, second, and third classes in Argentina and Paraguay are used in the construction of the weather map, besides the rainfall from about 1,350 stations, and, in exchange for Argentina data, the general observations made at 8 a. m. from 6 stations in Uruguay, 10 in Brazil, and 26 in Chile.

The Hydrometric Section was established in July, 1902, to study the stream flow and water resources of Argentina, and to provide for flood warnings. Daily gage readings have been made of the more important rivers and the hydrography of many possible dam sites has been more or less completely studied. Reports have been made on the topography of certain drainage basins and irrigation projects. The possibilities of utilizing river water, especially for irrigation, and those of hydroelectric power development have been partially examined. In 1912 the section began the measurement of ground water levels. In June, 1913, the publication of a synopsis and forecast of river stages was commenced in the daily weather map. Discharge curves have been calculated for many of the rivers.

The Magnetic Section was established in 1904 at Pilar in the Province of Córdoba. Magnetic observations had been made from time to time in Argentina since early in the 19th century. Systematic work began at Pilar when the Meteorological Office took over the station in the South Orkneys. Field operations in various parts of the country were carried out in 1904, and again in 1908 and 1912–1913, when the same stations were occupied to determine the rate of secular change.

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REPORT OF THE METEOROLOGICAL STATION AT BERKELEY, CAL., FOR THE YEAR ENDING JUNE 30, 1915.[1]

By WILLIAM GARDNER REED.

[*Author's abstract*, submitted Mar. 12, 1917.]

The work of the Meteorological Station maintained by the University of California was carried on by the Department of Geography during the year ending June 30, 1915. A complete statement of the history of the station and of the instruments and exposures was published in the reports for the years ending June 30, 1913,[2] and June 30, 1914.[3]

Pressure.—Pressure was measured twice daily, at 8^h and 20^h, mean civil time of the 120th meridian west from Greenwich (16^h and 4^h Greenwich mean civil time, or 8 a. m. and 8 p. m., Pacific Standard Time, the time in local use). The barometer in use is a Fortin cistern mercurial instrument of the United States Weather Bureau pattern. Although pressure relations are doubtless of great importance as showing the character of the seasons in California, unfortunately no correlations have been made between monthly pressures and other meteorological conditions at

[1] Univ. Cal., Publ. geogr., Berkeley, Feb. 28, 1917, 1: 441–504.
[2] *Abstract in* MONTHLY WEATHER REVIEW, Mar. 1914, 42: 164–166.
[3] *Abstract in* MONTHLY WEATHER REVIEW, Apr. 1916, 44: 202–204.

Berkeley. February, generally a month of considerable cyclonic activity, showed even greater pressure variations than usual. The total range in February, 1915, was 39.6 mb., 30 mm., or 1.17 inches, which is only 0.4 mb. less than the annual range. The range in a single cyclone in February was 39.4 mb. The lowest pressure in the year ending June 30, 1915, was 990.8 mb., 743 mm., or 29.26 inches, at 13h (1 p. m.), on January 29, during a cyclone which produced a depression of the barograph trace more marked than any previously recorded at Berkeley since the beginning of continuous pressure records in July, 1912. This pressure is one of the notable low pressures at Berkeley and is the lowest record for January.

The relation between temperature and pressure does not appear close, as judged by the data for 1914–15. The departures from the mean monthly and mean monthly minimum temperatures show very little similarity to the pressure departures. This information is contained in Table 3.

TABLE 3.—*Comparison of departures from 28-year averages, Berkeley, Cal., 1914–15.*

Month.	Mean monthly pressure.	Mean monthly temperature.	Mean minimum temperature.	Total monthly precipitation.
1914.	*mb.*	*° A.*	*° A.*	*mm.*
July	+3.1	±0	−1	−0.5
August	+2.4	±0	±0	−1.0
September	+1.7	±0	−2	−14.2
October	−0.1	+1	±0	−15.1
November	+0.8	+1	±0	−57.3
December	−2.0	−1	−1	+58.2
1915.				
January	−1.7	±0	±0	+23.9
February	−3.0	+1	+1	+101.9
March	−1.2	+3	+1	−69.8
April	−1.2	+1	−1	−14.8
May	−0.2	±0	−1	+101.4
June	+0.4	−1	−1	−5.3
Year 1914–15	+0.6	±0	−1	+107.4

Temperature.—While it has not been practicable to determine the pressure conditions at times of very high or very low temperature at Berkeley, it may be noted that neither the minimum temperature and the maximum pressure, nor the maximum temperature and the minimum pressure, occurred on the same day in 1914–15. In general, high temperatures occur with "north wind" conditions; these high temperatures result from strong insolation due to clear skies and low humidities, together with dynamic warming of rapidly moving and descending air. This condition is the result of high pressure over the Basin Region rather than of any particular pressure relations at Berkeley. Low pressures occurred at Berkeley during the passage of cyclones, and at such times the sky was overcast and rain falling, so that opportunities for strong insolation were wanting, and hence low pressures were not accompanied by high temperatures. The highest temperatures are apt to occur in the late summer, when the coast fog has ceased to be a factor, or in the early summer before the fog conditions have set in. The lowest temperatures have occurred during winter anticyclones. The amount of the daily range depends to a large extent upon the sunshine and cloudiness; months with considerable cyclonic or "velo" cloud have small daily ranges. The greatest daily range of the year, 23°A. (41°F.), occurred on September 10, which was the day with the highest mean temperature, and also the day with the highest maximum. The smallest daily range was 2°A. (3°F.), on May 10, during a period of cyclonic rainfall, although the pressure relations at this time are somewhat obscure. The annual mean range; that is, the temperature difference between the warmest and the coldest month, for 1914–15, was slightly less than the mean daily range. The average of the 28 years is the same as the mean daily range for the 28 years. As has been previously pointed out, this correspondence is due to the location of Berkeley on the "meteorological tropic."

TABLE 4.—*Extreme temperatures at Berkeley, Cal., July, 1887–June, 1915.*

Month.	Maximum.			Minimum.		
	°A.	*°F.*	*Date.*	*°A.*	*°F.*	*Date.*
July	309	97	7, 1905	288	42	29, 1899
August	307	93	22, 1891	281	46	31, 1905
September	314	106	16, 1914	281	46	28, 1905
October	308	95	1, 1914	277	39	18, 1905
November	301	82	16, 1895	274	33	28, 1905
December	294	70	24, 1901	272	31	24, 1905
January	298	77	26, 1899	269	25	14, 1888
February	299	80	18, 1899	271	29	12, 1905
March	304	87	17, 18, 1914	274	34	30, 1905
April	303	87	24, 1913	275	36	19, 1896
May	307	92	28, 1896	277	40	1, 1899
June	311	101	6, 1903	279	42	2, 1903
Year	314	106	Sept. 16, 1914	269	25	Jan. 14, 1888

Humidity.—In Table 5 an attempt has been made to show the average of the greatest strain on organisms each day. This strain is, perhaps, best indicated by the maximum saturation deficit, which is the saturation deficit [4] at the time of maximum temperature. The values given in the table are to be regarded as approximations, as they were obtained from the mean maximum temperatures and from vapor pressures computed from psychrometer readings at 20hrs (8 p. m.). This is incorrect in theory, as the saturation pressure increases much more rapidly than the temperature, but a study of the actual saturation deficits at selected times showed that no appreciable error was introduced.

TABLE 5.—*Mean daily maximum saturation deficit at Berkeley, Cal.*

[Difference between saturation and actual vapor pressures at time of daily maximum temperature.]

Month.	1914–1915		1892–1915	
1914.	*mb.*	*In.*	*mb.*	*In.*
July	7	0.28	8	0.30
August	7	0.28	7	0.26
September	10	0.38	8	0.30
October	11	0.41	7	0.28
November	11	0.41	5	0.20
December	4	0.15	4	0.14
1915.				
January	4	0.16	3	0.11
February	4	0.15	4	0.16
March	4	0.15	3	0.11
April	6	0.23	6	0.22
May	6	0.23	7	0.25
June	7	0.24	8	0.31
Year 1914–1915	7	0.26	6	0.22

NOTE.—These values were estimated from saturation pressures determined from the mean maximum temperatures by the use of the Marvin tables (U. S. Weather Bureau, psychrometric tables for obtaining the vapor pressure, relative humidity, and temperature of the dew point from readings of the wet- and dry-bulb thermometers, Washington, 1912) and the average 20 hours (8 p. m.) vapor pressures. A partial study showed that the errors of this method are small and have a tendency to cancel out. It is probable that the errors in the result shown in the table are less than those due to exposure conditions.

Cloudiness.—Cloudiness at Berkeley, specially in summer, is closely related to atmospheric moisture. The summer cloud at Berkeley is usually the low stratus or velo [5] cloud, locally in California known as "high fog";

[4] The *saturation deficit* may be defined as the difference between the vapor pressure at any time and the saturation pressure at the current temperature. It is a measure of the lack of saturation and hence of the tendency to evaporation.

[5] *Carpenter, F. A.* The Climate and weather of San Diego, Cal. San Diego, 1913. pp. 5–7.

the winter cloud is almost always of cyclonic origin, as is some of the summer cloud.

The partly cloudy days may be divided into two groups: Those on which the sky was from three-tenths to seven-tenths cloud-covered through the day, and those on which the sky was more or less overcast for a part of the day, usually morning and evening. The first group is associated with the margin of a cyclone and is, therefore, a winter rather than a summer phenomenon, although not unknown in the summer. The second type is associated with fog or velo cloud conditions in the morning and evening with clear sky through the day; this type is more common in summer, although it occurs with "tule" fog in winter, and also sometimes with the approach or departure of a cyclone.

Cloudy days occur in winter with cyclones and in summer when the velo cloud persists through the day. Under the conditions of observation at Berkeley, the distinction between clear and partly cloudy days is usually well marked, and the records of different observers show practically the same number of clear days; but the distinction between partly cloudy and cloudy days is not so sharp, different observers often estimating the same day as cloudy or partly cloudy, the difference being the result of the personal equation or the exact times when sky conditions are noted.

Fog.—At stations near the California coast the adequate treatment of fog is difficult, because of the broken character of the topography, with the resulting difference in altitude, which makes any record of fog according to the ruling of the International Meteorological Committee[6] applicable only to the spot where the observation was made. The difficulty is not so great in the case of the "tule" fogs of winter, which are very dense and fill the valleys, including the valley of San Francisco Bay, to the top of the fog layer; this is usually clearly marked at 100 to 150 meters (300 to 500) feet above sealevel. The summer fog is a much more complex phenomenon. It is partly formed over the Pacific Ocean, probably by mixture, and is carried to the land by the westerly winds of summer, often in detached masses. At times this fog comes in at the surface of the earth and at times it appears as a low stratus or fracto-stratus cloud—the velo cloud of Carpenter. A further difficulty results from the fact that the fog is not always formed over the ocean, but the slight cooling resulting from the deflection upward by the Berkeley Hills is frequently sufficient to produce fog. All gradations exist, from a dense surface fog enveloping the whole of the San Francisco Bay region to small patches of fracto-stratus cloud on the higher portions of the Berkeley Hills.

Frost.—Although the frost record is not complete, this phenomenon seems to occur annually at Berkeley; it is probable, however, that frosts properly classed as "killing" do not occur every winter. Light or heavy frosts occur more or less frequently between early November and early April. In 1914–15 frost was recorded on 14 mornings, of which 11 were in December and 3 were in January. November and March were too warm for frost, and February was a month of cloud and rain, which prevented nocturnal cooling. Frost characteristically occurs at Berkeley on anticyclonic nights when the terrestrial radiation is strong, usually after considerable transfer of air from the dry continental interior.

At Berkeley in 1914–15 but one thunderstorm was recorded, although lightning was reported once in addition (January 11).[7] The thunderstorm occurred about noon on February 16, and was accompanied by hail. An unusual feature of this thunderstorm was its time of occurrence, the relatively rare thunderstorms of west coast regions almost always occurring at night during periods of cyclonic clouds. February 16, 1915, appears from the barograph trace to be about the middle of a cyclonic period, and showers occurred during the day and the preceding night.

Precipitation.—The number of days with measurable precipitation (0.2 mm., 0.01 inch, or more) was 87 for the year, which is about 30 per cent more than the 28-year average. The greatest number of rainy days in any one month was 19 in February, making a new record for this month. This number has been exceeded in only three months since the beginning of the record.

Figure 1 is an attempt to show the duration of periods without measurable precipitation and of continuous periods during which the daily rainfall was 0.2 mm. or more. All records of rainy days are referred to the rainfall day of the station, which is the 24 hours ending at 20^h (8 p. m.) mean civil time of the 120th meridian. The date is the civil date on which the last 20 hours of

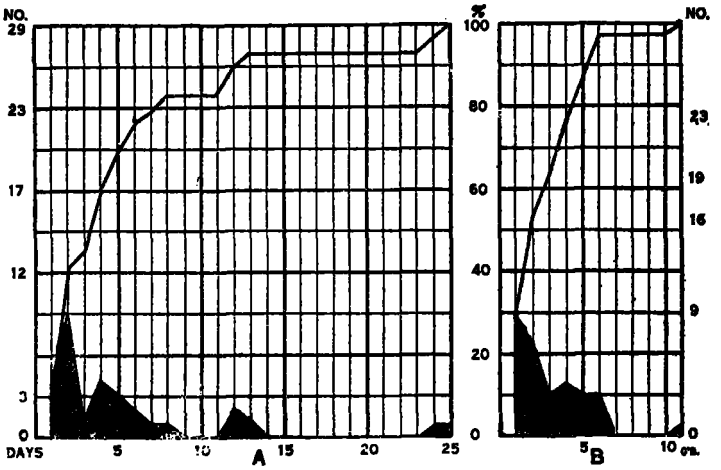

Fig. 1.—A, consecutive days without precipitation; B, consecutive days with precipitation; Berkeley, Cal., September 7, 1914, to May 24, 1915.

the rainfall day falls; that is, the rainfall day ends four hours before the civil day. Diagram A of figure 1 shows by its shaded area the percentage of occurrence of rainless periods of different duration between the first rain in Fall, September 7, and the last rain in Spring, May 25. Of a total of 29 such periods, 3 were of 1 day's duration, 9 were of 2 days' duration, and so forth. The line is a summation of the periods shown by the shaded areas; for example, 12 periods or 40 per cent of the total lasted for 2 days or less. There was no period without rain of more than 25 days' duration, except the long dry Summer at the beginning and end of the meteorological year; this is not shown by the diagram. The record has included only the fact of precipitation of 0.2 mm. (0.01 inch), or more on the rainfall day; if rain was falling long enough before and after 20^h (8 p. m.) for a measureable amount to be collected, both rainfall days were counted as days with precipitation. Figure B is similar to figure A, except that it shows periods of consecutive rainfall days on which measureable precipitation occurred. There were during the year 30 such periods. Of these 9, or 30 per cent, occurred within 1

[6] "Fog is to be recorded only when the observer is enveloped in it." Internationaler Meteorologischer Kodex. ed. 2, Berlin, 1911.

[7] "Only days on which both thunder and lightning are observed are to be counted as days with thunderstorms." Internationaler Meteorologischer Kodex. ed. 2, Berlin, 1911, p. 19.

rainfall day; 7, or 23 per cent, occurred on 2 rainfall days, and so forth. The longest period with daily rain was 11 days. The line is the summation of the periods shown by the shaded areas.

The total precipitation for the year 1914–15 was 786.1 mm. (30.95 inches), which is 107.4 mm. (4.20 inches): that is, 16 per cent more than the average annual amount based on the 28 years of the Berkeley record. The precipitation for each month is shown by Table 1, and the monthly averages appear in Table 2. The rainiest month was February, with 207.8 mm. (8.18 inches); this is nearly twice the February average. The

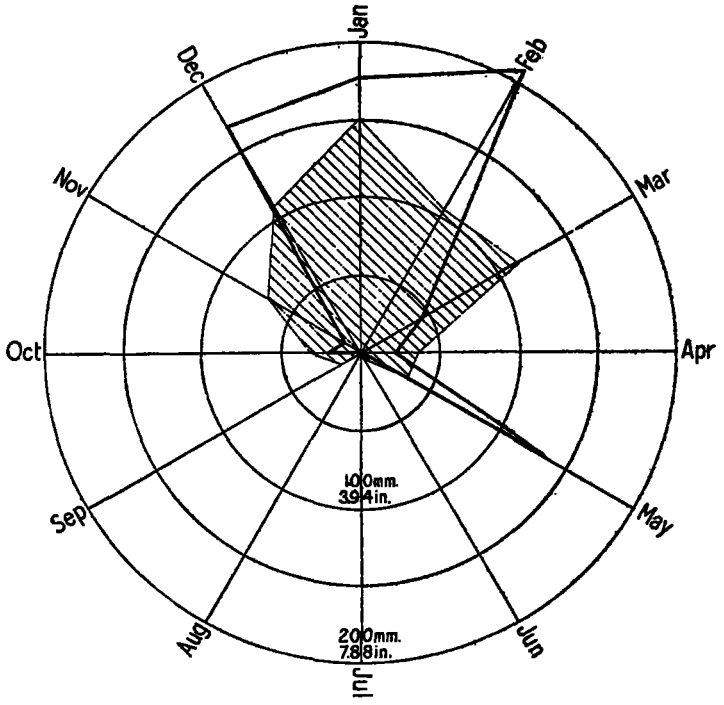

Fig. 2.—Monthly precipitation at Berkeley, Cal., 1914–15, and (shaded area) average monthly precipitation, 1887–1915.

May rainfall, 133.6 mm. (5.26 inches) is a new record for May; it is 46.5 mm. (1.83 inches) more than the amount for May, 1905, the May of heaviest precipitation previous to 1915. Table 6 shows the accumulated excess or deficiency in precipitation at the end of each month of 1914–15 as compared with the average of the 28 years. The accumulated amounts for the year were below the average until January, but after that month there was an excess. At the end of May the excess was 112.7 mm. (4.44 inches); but on account of the dry June the excess at the end of the meteorological year was only 107.4 mm. (4.20 inches).

TABLE 6.—*Monthly and seasonal precipitation at Berkeley, Cal., July 1, 1914–June 30, 1915; with averages for 28 years and departures from the averages.*

Month.	Monthly.		Seasonal to end of month.		Average seasonal.		Departure, 1914–15.	
1914.	*mm.*	*In.*	*mm.*	*In.*	*mm.*	*In.*	*mm.*	*In.*
July	T.	T.	T.	T.	0.5	0.02	−0.5	−0.02
August	0.0	0.00	T.	T.	1.5	0.06	−1.5	−0.06
September	0.5	0.02	0.5	0.02	16.2	0.64	−15.7	−0.62
October	21.3	0.84	21.8	0.86	52.6	2.07	−30.8	−1.21
November	10.9	0.43	32.7	1.29	120.8	4.75	−88.1	−3.46
December	167.1	6.58	199.8	7.87	229.7	9.04	−29.9	−1.17
1915.								
January	176.7	6.96	376.6	14.83	382.6	15.05	−6.0	−0.23
February	207.8	8.18	584.4	23.01	488.5	19.22	+95.7	+3.79
March	46.5	1.83	630.9	24.84	604.8	23.81	+26.1	+1.03
April	21.6	0.85	652.5	25.69	641.2	25.24	+11.3	+0.45
May	133.6	5.26	786.1	30.95	673.4	26.51	+112.7	+4.44
June	0.0	0.0	786.1	30.95	678.7	26.72	+107.4	+4.23
Season 1914–15	786.1	30.95	786.1	30.95	678.7	26.72	+107.4	+4.20

TABLE 7.—*Summary of precipitation by rainfall days, Berkeley, Cal., 1914–15.*

[The rainfall day is the 24 hours ending at 20h (8 p. m.) mean civil time of the 120th meridian west from Greenwich (4h Greenwich mean civil time).]

Month.	Total precipitation.	Days with precipitation. ≥0.2 mm. No.	≥0.2 mm. Average precipitation.	≥1.0 mm. No.	≥1.0 mm. Average precipitation.
1914.	*mm.*		*mm.*		*mm.*
July	T.	0	.....	0	....
August	0.0	0	.....	0	....
September	0.5	1	0.5	0	....
October	21.3	4	5.3	2	10.4
November	10.9	4	2.7	4	2.7
December	167.1	14	11.9	14	11.9
1915.					
January	176.7	17	10.4	16	11.0
February	207.8	19	10.9	16	12.9
March	46.5	9	5.2	8	5.8
April	21.6	5	4.3	5	4.3
May	136.6	14	9.6	10	13.1
June	.....	0	.....	0	....
Year	786.1	87	9.0	75	10.4

Forty rainy cyclones were recognized, with a total of 785.6 mm. (30.93 inches) of rain. This includes all the rain of the year, except a small amount from a fog shower on September 7. The average precipitation per cyclone with rain was 19.6 mm. (0.77 inch). This is somewhat more than the average for 1913–14; the difference seems to be real, although in such a matter the success with which cyclones have been separated is an important factor.

The two cyclones with the greatest precipitation each had 66 mm. (2.60 inches) of rain; the duration of one was 4 days, and that of the other was 5 days. At least two true cyclones resulted in only a trace of rain at Berkeley.

Winds.—Wind direction was observed regularly at 8h and 20h (8 a. m. and 8 p. m.), 120th meridian time. As it has not yet been possible to install a proper wind vane, the observations are subject to considerable error. The observation hours are times at which the wind direction on the campus is most apt to be influenced by feeble drafts from Strawberry Canyon. The wind directions at the observation hours are the result of one or more of the following tendencies: (1) the prevailing surface drift of the air from a southwesterly or westerly direction; (2) a flow of air from the hills due to local cooling, specially important at the time of the evening observation, 20h (8 p. m.), 120th meridian time; (3) cyclonic winds, generally from the south or southeast, the result of a cyclone central north of Berkeley; and (4) anticyclonic winds resulting from the development of comparatively high pressures more or less connected with the continental hyperbar, these winds being generally from the north or northeast.

All directions except those of the three octants between southeast and west are of comparatively minor importance, although north and northeast winds have a very marked influence on the character of the days on which they occur; these days are hot and dry on account of the dynamic warming of the rapidly moving and descending air. Their number is, however, very small. Calm was recorded at 94 observation hours, which appears to be somewhat less than the average; but because of the generally low wind velocities the records made by different observers can not be regarded as homogeneous.

The seasonal and monthly distribution of winds from the different directions is shown by Table 1 and also in part by figure 3. This figure is the result of an attempt to distinguish summer and winter conditions by the daily prevailing winds. The solid line of figure 3 shows by months the percentages of days with prevailing winds from the southwest and west. Southwest and west winds

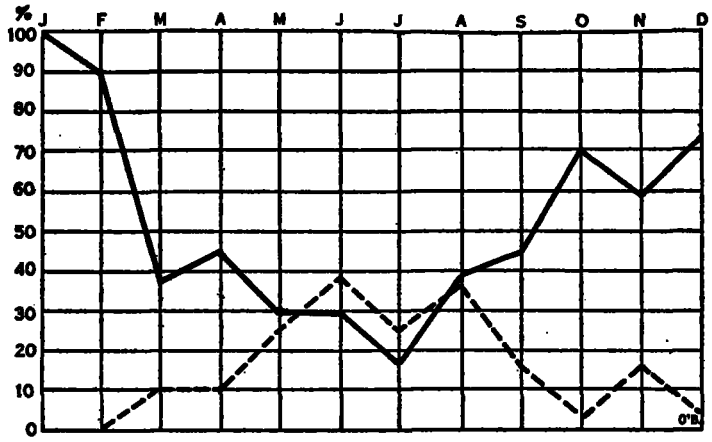

Fig. 3.—Summer and winter winds at Berkeley, Cal., 1914–15.
— Percentage of days with the prevailing wind direction southwest or west.
--Percentage of days with the prevailing wind direction southeast or south.

are those associated with summer conditions. The broken line shows in the same manner the percentage of days with prevailing winds from the southeast and south, the characteristic cyclonic wind directions at Berkeley. This diagram shows the winter or summer characteristics of each month as indicated by the wind directions. As is to be expected, the months with high percentages of summer prevailing winds are those with low percentages of winter prevailing winds.

SUMMARY.

The mean sea-level equivalent of the air pressure at Berkeley for the year ending June 30, 1915, was 1016 mb., about the average pressure for the 28 years of record. The departures of the monthly means were small and irregular. The highest pressure, 1031 mb., occurred on February 4, and the lowest, 991 mb., on January 29. Neither is a new record for Berkeley, although the minimum for the year was a notably low pressure.

The mean temperature for the year was 287 degrees A (57 degrees F.), which is practically the average for Berkeley; the mean annual range was 9 degrees A (15 degrees F.), and the annual extreme range, 33 degrees A (58 degrees F.). The highest temperature was 307 degrees A (94 degrees F.), on September 10; the lowest was 274 degrees A (36 degrees F.), on December 8. The mean monthly range was 20 degrees A (36 degrees F.); the mean daily range was 10 degrees A (17 degrees F.), varying from 25 degrees A (45 degrees F.), in September, to 14 degrees A (26 degrees F.) in January and February. The greatest daily range was 23 degrees A (41 degrees F.) on September 10, and the smallest was 2 degrees A (3 degrees F.) on May 10. September and October were the warmest months, the mean temperature for October being somewhat higher than the average for that month. December was the coldest month. Frosts occurred mostly in December, when frost was reported on 11 mornings; the other 3 frosts reported were all in January.

The pressure of the water vapor of the atmosphere was generally less than 15 mb. (0.420 inch). Relative humidities were slightly higher than the average, being 89 per cent at both morning and evening observation hours. The mean of the saturation deficits for each day at the time of greatest strain on organisms was 7 mb. (0.26 inch), which is slightly more than the average of the 23 years of comparable observations of atmospheric moisture. The average saturation deficit at time of daily maximum temperature was greatest in October and November, 11 mb. (0.41 inch), and least in January, February, and March, 4 mb. (0.15 inch). The average cloudiness at the observation hours was 0.5; the greatest monthly average was 0.9 for the morning and 0.7 for the evening hour in July, which is about 50 per cent more than the average; November was the least cloudy month, 0.2 at each observation hour.

The weather by days was as follows: 44 per cent clear, 25 per cent partly cloudy, and 31 per cent cloudy. August had the greatest number of cloudy days (18), and November the smallest (3). June and October each had 22 clear days, and February had 6. Fog as defined by the international meteorological committee occurred on 28 days, with a maximum of 7 in June and a minimum of none in February. Velo cloud, or "high fog," occurred on about 50 other days, which is a rather large number. But one thunderstorm occurred during the year, about noon on February 16; a daytime thunderstorm is a very unusual occurrence on the California coast.

The total number of days with measurable precipitation was 87, which is about 30 per cent more than the average. The greatest number in any month was 19, in February. December, January, February, and May had more than the average number of rainy days, the number for May being nearly three times the average. There were 29 periods without rain between the first rain in autumn and the last in spring; of these 40 per cent lasted 2 days or less, 60 per cent 4 days or less, 80 per cent 6 days or less; the longest dry period, except the dry summer, was 25 days. Of the 30 periods of consecutive rainy days 30 per cent lasted 1 day, 50 per cent 2 days or less, and 80 per cent 4 days or less; the longest such period was 11 days.

The total precipitation for the year was 786 mm. (30.95 inches), which is 16 per cent more than the average. September, October, November, March, April, and June had less than the average amount; December, January, February, and May had more than the average. The precipitation of May was the heaviest recorded for that month; it was 134 mm. (5.26 inches), which is 418 per cent of the May average. The rainiest month was February, with 208 mm. (8.18 inches). August and June had no rain, and July had only a trace.

The greatest precipitation on any rainfall day was 36 mm. (1.40 inches) on December 16. The greatest amount in the 24 hours ending at an observation hour was 44 mm. (1.72 inches) to the morning observation on December 17. The average amount of precipitation per day with measurable precipitation was 9 mm. (0.35 inch); December had the greatest average, 12 mm. (0.42 inch). The average amount per day with significant precipitation was 10 mm. (0.39 inch); May and February had the highest averages, 13 mm. (0.51 inch).

With the exception of 0.5 mm. (0.02 inch), the rain was the result of more or less well-defined cyclones, of which 40 were recognized. The average precipitation per cyclone with rain was 19.4 mm. (0.77 inch). The rainiest cyclones were those of December 15–18 and January 26–30, each of which had 66 mm. (2.6 inches) of rain. The longest cyclone was 7 days in length, January 19–25. The study of precipitation by cyclones was made solely

with a view to assigning the rain to the proper cyclone; no attempt was made to study the cyclonic weather of Berkeley from any other point of view.

Practically all the wind was from a southerly or westerly direction, but 33 days having prevailing winds from the north and east. The amount of north and east wind was slightly greater at the observation hours. One day was recorded as calm, but no movement of wind was observed at 94 observation hours, 13 per cent of all observations. Summer wind conditions prevailed on 53 per cent of the days, varying from 100 per cent in July to 16 per cent in January. Winter wind conditions prevailed on 15 per cent of the days; the maximum was 39 per cent in December; the minimum was none in July and August.

TABLE 1.—*Meteorological summary, Berkeley, Cal., for the year ending June 30, 1915.*

[H=100.6 m; H_b=98.0 m; h_t=1.5 m; h_r=4.6 m; ϕ=37° 52′ N.; λ=122° 16′ W. 120th meridian time.]

Month.	Pressure.			Temperature.							Moisture.									
		Extremes.		Mean.					Extremes.		Dew point.		Relative humidity.		Vapor pressure.		Precipitation.		Cloudiness.	
	Monthly mean.	Maximum.	Minimum.	8 hrs. (8ᵖ).	20 hrs. (8ᵖ).	Maximum.	Minimum.	Monthly.	Maximum.	Minimum.	8 hrs. (8ᵖ).	20 hrs. (8ᵖ).	8 hrs. (8ᵖ).	20 hrs. (8ᵖ).	8 hrs. (8ᵖ).	20 hrs. (8ᵖ).	Total.	Maximum in 24 hours.	8 hrs. (8ᵖ).	20 hrs. (8ᵖ).
	mb.	*mb.*	*mb.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	%	%	*mb.*	*mb.*	*mm.*	*mm.*	*0–10*	*0–10*
July	1016.6	1019.9	1010.5	286	286	293	281	289	299	276	285	286	91	93	14.1	14.3	T	T	9	7
August	1015.9	1021.0	1010.5	287	286	293	285	289	300	283	285	285	89	93	14.2	14.1	0.0	0.0	8	6
September	1015.5	1023.3	996.6	288	287	295	284	290	307	282	284	286	83	80	13.4	12.5	0.5	0.5	6	2
October	1015.8	1023.3	1009.4	287	287	295	284	290	306	280	284	284	83	83	13.0	12.9	21.3	15.5	4	3
November	1019.0	1027.1	1002.7	283	285	294	281	287	301	278	280	281	84	85	10.3	10.6	10.9	5.6	2	2
December	1016.2	1027.7	1003.3	279	281	285	278	281	293	274	277	279	87	87	8.4	9.4	167.1	43.7	4	3
January	1017.3	1029.5	990.8	280	282	286	278	282	290	275	279	279	92	80	9.9	9.7	176.8	23.9	6	5
February	1015.6	1030.8	991.2	282	282	287	279	284	290	276	281	281	92	85	10.5	11.1	207.8	33.0	6	6
March	1018.4	1028.7	1006.4	284	285	292	281	287	303	278	282	283	90	90	11.7	12.2	46.5	18.8	4	4
April	1015.7	1023.3	1005.0	285	285	291	282	287	298	279	283	284	90	94	12.1	12.9	21.6	13.5	6	5
May	1015.0	1023.3	1003.3	287	286	291	283	287	302	278	285	284	89	92	14.2	13.3	133.6	37.3	5	4
June	1014.2	1024.3	1007.1	289	287	295	283	289	303	282	287	286	88	92	16.0	14.9	0.0	0.0	3	3
Year	1016.3	1030.8	990.8	285	285	291	281	287	307	274	283	283	89	89	12.3	12.3	786.1	43.7	5	5

Month.	Wind.										Number of days.													
	Prevailing direction.	Number of winds, 8 hrs. and 20 hrs.									Clear.	Partly cloudy.	Cloudy.	Precipitation.		Snow.	Frost.	Hail.	Dense fog.	Maximum temperature.		Minimum temperature 273° or below.	Electricity.	
		North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calm.				0.2 mm. and over.	1.0 mm. and over.	T or more.				273° or below.	305° or above.		Thunderstorms.	Aurora.
July	SW.	0	0	0	15	28	5	8	2	4	8	18	5	0	0	0	0	0	1	0	0	0	0	0
August	SW.	1	0	0	6	22	21	4	3	5	7	15	9	0	0	0	0	0	4	0	0	0	0	0
September	S.	0	1	6	5	14	9	9	1	15	15	10	5	1	0	0	0	0	5	0	1	0	0	0
October	S.	1	3	6	5	16	9	3	1	18	19	5	7	4	2	0	0	0	1	0	2	0	0	0
November	SW.	9	1	6	5	10	6	7	2	8	22	5	3	4	4	0	0	0	3	0	0	0	0	0
December	SE.	7	6	3	18	8	9	4	5	2	14	3	14	14	14	0	11	0	1	0	0	0	0	0
January	N.	12	8	2	11	11	7	1	7	3	11	4	16	17	16	0	3	0	1	0	0	0	0	0
February	SE.	7	5	4	14	8	9	5	4	0	6	7	15	19	16	0	0	1	0	0	0	0	1	0
March	SW.	0	7	5	16	12	9	2	2	9	15	5	11	9	8	0	0	0	2	0	0	0	0	0
April	W.	4	9	5	2	9	15	6	6	4	9	8	13	5	5	0	0	0	2	0	0	0	0	0
May	W.	3	1	1	6	9	10	24	4	20	14	5	12	14	10	0	0	0	1	0	0	0	0	0
June	W.	1	0	0	7	6	10	29	1	6	22	7	1	0	0	0	0	0	7	0	0	0	0	0
Year	SW.	45	41	38	110	153	119	102	38	94	162	92	111	87	75	0	14	1	28	0	3	0	1	0

TABLE 2.—*Meteorological summary, Berkeley, Cal., for the 28 years, July 1, 1887, to June 30, 1915.*

From—	ϕ	λ	H	H_b	h_s	h_r	Hours of observation.	
							Civil time 120th meridian.	G. M. T. (civil).
			meters.	*meters.*	*meters.*	*meters.*		
July 1, 1887	37° 52′ N	122° 16′ W	102.4	96.6	2.1	6.4	7, 14, 21	15, 22, 5
Sept. 1, 1899	37° 52′ N	122° 16′ W	96.3	96.6	2.1	0.3	8, 20	16, 4
Oct. 1, 1899	37° 52′ N	122° 16′ W	100.6	96.6	2.1	4.6	8, 20	16, 4
July 1, 1912	37° 52′ N	122° 16′ W	100.6	98.0	1.5	4.6	8, 20	16, 4

Month.	Pressure.			Temperature.							Moisture.									
		Extremes.		Mean.					Extremes.		Dew point.		Relative humidity.		Vapor pressure.		Precipitation.		Cloudiness.	
	Monthly mean.	Maximum.	Minimum.	8 hrs.*	20 hrs.*	Maximum.	Minimum.	Monthly.	Maximum.	Minimum.	8 hrs.*	20 hrs.*	8 hrs.*	20 hrs.*	8 hrs.*	20 hrs.*	Mean.	Maximum in 24 hours.	8 hrs.*	2 hrs.*
	mb.	*mb.*	*mb.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	°*A.*	%	%	*mb.*	*mb.*	*mm.*	*mm.*	*0–10*	*0–10*
July	1013.5	1023.3	1001.7	288	288	294	285	289	309	279	285	286	87	85	14	15	0.5	11.6	6	5
August	1013.5	1021.3	1001.0	287	288	294	285	290	307	281	286	286	88	87	15	15	1.0	21.3	7	6
September	1013.8	1022.6	996.6	287	289	295	283	290	314	281	285	286	87	85	14	15	14.7	69.9	5	4
October	1015.9	1025.7	998.0	286	287	292	284	289	308	277	284	285	86	84	13	14	36.4	81.7	4	3
November	1018.2	1044.0	992.8	283	285	290	274	281	301	274	281	282	89	84	11	12	68.2	62.7	5	4
December	1018.2	1032.4	996.9	280	282	285	279	282	294	272	279	280	87	85	9	10	108.9	75.1	4	4
January	1019.0	1035.5	990.8	280	282	285	279	282	298	269	278	280	90	88	10	10	152.9	95.6	6	4
February	1018.6	1033.2	988.8	281	281	287	280	283	299	271	279	281	88	86	9	11	105.9	125.3	5	2
March	1017.2	1031.2	989.8	282	284	288	280	284	304	274	280	281	88	87	10	11	116.3	90.7	6	4
April	1016.9	1031.2	989.8	284	284	290	281	286	303	275	282	282	86	86	11	12	36.4	65.6	5	4
May	1015.2	1026.4	1001.7	286	286	292	283	287	307	277	284	284	85	86	13	13	32.2	57.1	5	4
June	1013.8	1024.3	998.3	288	288	294	284	289	312	279	285	285	84	85	14	14	5.3	16.7	5	4
Year	**1016.2**	**1044.0**	**988.8**	**284**	**286**	**290**	**282**	**286**	**314**	**269**	**282**	**283**	**87**	**85**	**12**	**13**	**678.7**	**125.3**	**5**	**4**

Month.	Wind.										Number of days.													
	Prevailing direction.	Number of winds, 8 hrs. and 20 hrs.									Clear.	Partly cloudy.	Cloudy.	Precipitation.		Snow.	Frost.	Hail.	Dense fog.	Maximum temperature.		Minimum temperature 273° or below.	Electricity.	
		North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calm.				0.2 mm. and over.	1.0 mm. and over.	T or more.				273° or below.	305° or above.		Thunderstorms.	Aurorae.
July	Not computed.	1	0	2	3	16	13	9	9	16	13	7	11	(†)	(†)	Not computed.	0	Not computed.	12	0	Not computed.	Not computed.	Not computed.	Not computed.
August		1	0	2	5	17	10	8	1	18	9	9	13	(‡)	(‡)		0		11	0				
September		2	1	2	5	10	6	6	2	25	13	8	9	2	1		0		7	0				
October		4	2	3	5	8	4	4	3	29	15	8	8	1	3		0		4	0				
November		5	4	5	5	7	3	2	3	26	15	6	9	1	5		4		4	0				
December		7	6	7	7	8	1	1	2	25	14	7	10	10	8		8		2	0				
January		4	5	6	9	9	2	1	3	23	11	8	12	10	11		8		2	0				
February		5	3	5	6	8	3	2	2	22	12	6	10	9	8		4		2	0				
March		6	2	3	6	10	5	4	4	22	12	7	12	10	9		3		2	0				
April		5	2	3	3	9	8	5	5	20	14	8	8	6	4		0		2	0				
May		3	1	3	4	11	8	4	3	20	13	8	10	5	3		0		2	0				
June		1	0	1	5	14	13	6	2	18	15	8	7	1	1		0		5	0				
Year	.....	**44**	**26**	**42**	**63**	**125**	**76**	**56**	**33**	**265**	**156**	**90**	**119**	**64**	**53**	.....	**27**	.....	**56**	**0**	.....	.....	.....	.....

*Sept. 1, 1892, to June 30, 1915. †The total number of days in 28 years was ≧0.2 mm, 9; ≧1.0mm., 3. ‡The total number of days in 28 years was ≧0.2 mm., 9; ≧1.0 mm., 3.